FREQUENCY COMPARISON Hydrogen MASER 40 0890 with LNE-SYRTE-**FO2**
From MJD 54194 to MJD 54219

The primary frequency standard LNE-SYRTE-FO2 in caesium mode was compared to the hydrogen Maser (40 0890) of the laboratory during the 4th to 29th April 2007 period, from MJD 54194 to MJD 54219.

Period (MJD)	y(HMaser$_{40\ 0890}$ - FO2)	u_B	u_A	$u_{link\ /\ maser}$
54194 – 54219	- 3836,3	3,9	1,8	1,15

Table 7: Results of the comparison in 1 x 10^{-16} .

Figure 3 collects the measurements of fractional frequency differences during the 4th to 29th April 2007 period. Error bars represent the combined statistical and systematic uncertainties. The measurements are corrected for the systematic frequency shifts listed below.
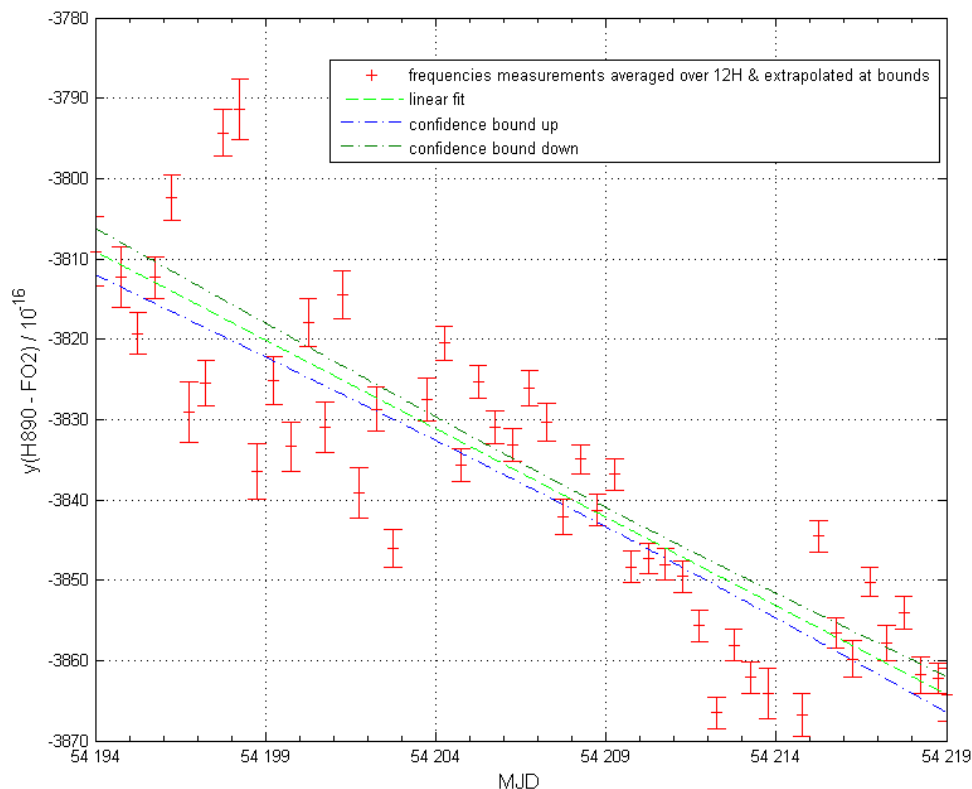

Figure 3: Fractional frequency averaged over 12H with associated statistical uncertainty of H890-FO2 during the period MJD 54194 to MJD 54219. The weighted linear fit with the confidence bounds up and low of 1σ are represented in dashed lines.

Table 8 gives a statistical synthesis of measurements and the results of the average calculation using different methods. Linear fit method was selected to estimate the average and the statistical uncertainty associated.

Dates Duration & Measurement Rate	Mean frequency difference normalized $y_{Maser} - y_{FO2}$	type A uncertainty σ_{Stat} & $\sigma_{Collision}$	Uncertainty due to the dead times $\sigma_{deadTime}$
BIPM interval Start date MJD UTC **54194,0** Stop date MJD UTC **54219,0** Length of interval 25 d Measurement Rate: 84,17% mean duration between measurements $\tau_0 = 45000$ s	Mean by linear fit at middle date 54206,5: $\bar{y} = $ **- 3836,28 x 10^{-16}** Mean by polynomial fit order 5: $\bar{y} = $ **- 3837,17 x 10^{-16}**	Uncertainty of linear fit $\sigma_A = $ **1.78 x 10^{-16}** Allan Deviation at T with assumption of White Frequency Noise $\sigma_y = $ **1.95 x 10^{-16}**	$\sigma_{deadTime} = $ **0,57 10^{-16}**

Table 8: Statistics resumes of SYRTE-FO2 fountain measurements

Table 9 resumes the budget of systematic effects and their associated uncertainties. More details on systematic effects and uncertainty due to the dead time are developed in the last TAI calibration by FO2 in December 2006.

	Correction (10^{-16})	Uncertainty (10^{-16})
Cold collisions and cavity pulling	84.7	0.7
Quadratic Zeeman effect	- 1919.3	0.1
Black body radiation	168.2	0.6
Microwave spectral purity & leakage		0.5
First order Doppler effect		3.0
Ramsey & Rabi pulling		< 1.0
Microwave recoil		< 1.4
Second order Doppler effect		< 0.1
Background gas collisions		<1.0
Total		**3.75**
Red shift	- 65.4	1.0
Total with red shift		**3.9**

Table 9: budget of systematic effects and uncertainties for SYRTE-FO2 fountain